

We claim:

1. A polishing pad comprising a hydrophilic polishing layer with a polishing surface, the polishing layer comprising a polishing material having:

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- i. a density greater than  $0.5 \text{ g/cm}^3$ ;
- ii. a critical surface tension greater than or equal to 34 milliNewtons per meter;
- iii. a tensile modulus of 0.02 to 5 GigaPascals;
- iv. a ratio of tensile modulus at  $30^\circ\text{C}$  to tensile modulus at  $60^\circ\text{C}$  of 1.0 to 2.5;
- 10 v. a hardness of 25 to 80 Shore D;
- vi. a yield stress of 300-6000 psi;
- vii. a tensile strength of 1000 to 15,000 psi; and
- viii. an elongation to break less than or equal to 500%;

15 the polishing material being useful for chemical mechanical polishing for the manufacture of semiconductor substrates comprising a polymer pad material selected from the group comprising urethane, carbonate, amide, sulfone, vinyl chloride, acrylate, methacrylate, vinyl alcohol, ester and acrylamide; wherein the polishing layer is porous and the polishing layer is formed without cutting or skiving parallel to the polishing surface.

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2. The polishing pad in accordance with Claim 1 wherein the polishing layer is formed by a process selected from the group consisting of molding, embossing, printing, casting, sintering, photo-imaging, chemical etching and solidifying.

25 3. The polishing pad in accordance with Claim 1 wherein the polishing surface has a micro-texture of indentations or micro-asperities of which an average depth is in the range of less than 50 microns.

30 4. A polishing pad in accordance with Claim 1 wherein the polymer includes urethane.

5. A polishing pad comprising a hydrophilic polishing layer with a polishing surface, the polishing layer comprising a polishing material having:

- i. a density greater than  $0.5 \text{ g/cm}^3$ ;
- 5 ii. a critical surface tension greater than or equal to 34 milliNewtons per meter;
- iii. a tensile modulus of 0.02 to 5 GigaPascals;
- iv. a ratio of tensile modulus at  $30^\circ\text{C}$  to tensile modulus at  $60^\circ\text{C}$  of 1.0 to 2.5;
- v. a hardness of 25 to 80 Shore D;
- vi. a yield stress of 300-6000 psi;
- 10 vii. a tensile strength of 1000 to 15,000 psi; and
- viii. an elongation to break less than or equal to 500%;

the polishing material being useful for chemical mechanical polishing for the manufacture of semiconductor substrates comprising a polymer pad material selected from the group  
15 comprising urethane, carbonate, amide, sulfone, vinyl chloride, acrylate, methacrylate, vinyl alcohol, ester and acrylamide; wherein the polishing layer is porous and the polishing layer is formed by molding without cutting or skiving parallel to the polishing surface.

6. The polishing pad in accordance with Claim 5 wherein the polishing surface has a micro-  
20 texture of indentations or micro-asperities of which an average depth is in the range of less than 50 microns.

7. A polishing pad in accordance with Claim 5 wherein the polymer includes urethane.

25 8. A method of manufacturing a polishing pad comprising a hydrophilic polishing layer with a polishing surface, the polishing layer comprising a polishing material having:

- i. a density greater than  $0.5 \text{ g/cm}^3$ ;
- ii. a critical surface tension greater than or equal to 34 milliNewtons per meter;
- iii. a tensile modulus of 0.02 to 5 GigaPascals;
- 30 iv. a ratio of tensile modulus at  $30^\circ\text{C}$  to tensile modulus at  $60^\circ\text{C}$  of 1.0 to 2.5;
- v. a hardness of 25 to 80 Shore D;

- vi. a yield stress of 300-6000 psi;
- vii. a tensile strength of 1000 to 15,000 psi; and
- viii. an elongation to break less than or equal to 500%;

5 the polishing material being useful for chemical mechanical polishing for the manufacture  
of semiconductor substrates comprising a polymer pad material selected from the group  
comprising urethane, carbonate, amide, sulfone, vinyl chloride, acrylate, methacrylate, vinyl  
alcohol, ester and acrylamide; comprising molding the polishing layer, the polishing layer  
being porous; and forming the polishing layer without cutting or skiving parallel to the  
10 polishing surface.

9. The method of claim 8 wherein the polishing layer includes polyurethane and including  
the additional step of applying an organic material to a mold surface prior to molding of the  
polishing layer.

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10. The method of claim 8 wherein the molding is a net-shape process for manufacturing  
the polishing pad.